

## PATENT SPECIFICATION

413,488

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## COMPLETE SPECIFICATION.

## Improvements in and relating to the Preparation of Tablets of Coffee or Mixtures containing Coffee.

I, HARRY AINLEY NEALE, a British Subject, of 36/37, Chandos House, Palmer Street, Westminster, London, S.W. 1, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a process for the preparation of coffee or mixtures containing coffee, whereby the flavour, aroma and other properties of the coffee may be retained for indefinite periods.

Coffee is one of the most difficult commercial products to preserve in fresh condition without losing its characteristic flavour and aroma.

Raw coffee beans, as available on the market, contain a complex mixture of insoluble compounds, some of which are modified in the subsequent roasting process, so that they become soluble in water. The essential oils, which are developed by the roasting and are the principal flavouring element in ground coffee, are rendered volatile, so that after roasted coffee has been ground and exposed to the air for some time, the delicate savour and aroma has largely been dissipated. It is for this reason that freshly roasted and ground beans yield a more satisfactory beverage than that obtained from previously ground coffee.

The deteriorating effect of time is further added to because in the process of roasting a considerable volume of gases is formed. These gases are mainly a mixture of 80% of carbon dioxide and 20% of carbon monoxide. A large quantity of these gases are held under pressure in the roasted beans. As time elapses, these occluded gases tend to escape, carrying with them further quantities of the essential oils. The heat of roasting drives off part of the oils and other products, so that in commercial practise 112 lbs. of green beans only yield about 98 lbs. of roasted beans.

In processes hitherto known, the aroma of roasted coffee is preserved in ratio to the speed with which it is cooled, so that after roasting it is generally cooled by an air draught circulated by a fan or

blower. This closes the pores and shrinks the surface, so hardening it. In the process herein described this operation is unnecessary and preferably should be omitted, as the softer and warmer the coffee, the easier it is to press into tablets.

Ground coffee not only loses its flavour due to loss of its oils, but in time it develops a flat, stale taste due to oxidation of the oils from contact with atmospheric oxygen.

Efforts have been made to minimise these effects of time by preserving the ground coffee in tins or cans which have been "vacuum sealed", that is, the air in the can has been partially exhausted by means of a vacuum pump, and the lid then applied and sealed hermetically or the can is otherwise sealed hermetically. This has not been entirely successful because the above mentioned occluded gases are gradually released, to such an extent that in many cases the vacuum is destroyed and a pressure is actually present in the cans. These gases, carrying with them a large proportion of the aromatic principles, are lost when the can is opened.

Other attempts have been based on compacting the ground coffee with a viscous liquid or syrup, such as, glucose, treacle, or "China soy", either by grinding the beans in syrup or mixing the previously ground coffee with syrup. Such a product is then cast hot in moulds. The chief drawback of this process is that the tablet will not break up when hot water is poured on it, but it is converted into a gelatinous mass which requires considerable stirring before it dissolves or breaks up. As is well known, it is necessary that ground coffee be made in "free" solution to obtain the best result.

Suggestions have been made previously in the treatment of coffee or mixtures containing coffee to effect either the grinding, or packing in the presence of inert gases or whilst excluding oxygen, whilst suggestions have also been made to pack coffee in cans in the presence of gases evolved from the roasted coffee. Suggestions have also been made to arrange a grinding mill for coffee in an airtight

manner between a closed feed hopper and a closed receptacle for the ground coffee. It has also been proposed to mix (or blend) coffee in an atmosphere of gases given off by the coffee, and to roast coffee in a vacuum or in an atmosphere of inert gas.

According to the present invention ground coffee or a mixture containing coffee is pressed into tablets in an atmosphere of an inert gas or gases or whilst excluding the presence of oxygen. Preferably all the stages of the process including blending, roasting, grinding, 10  
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tableting and packing or wrapping are carried out in an inert gas. The tablet or tablets to be stored may be sealed, preferably hermetically, in an inert gas within a container which may be of 20  
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tinned iron, lacquered transparent material prepared from a cotton or wood pulp base, metal foil, vegetable parchment or the like.

In carrying out the present invention the aroma and flavour of the ground coffee are preserved by preventing oxidization and reducing the quantity of occluded gases liberated. The process preferably consists in roasting the beans in an atmosphere of inert gas, such as carbon dioxide or in a mixture of inert gases, such as, 80% carbon dioxide and 20% carbon monoxide, which atmosphere may be supplied wholly or partially by the gases driven off the beans themselves when roasting. The inert gas, however, is preferably supplied from a container and is caused to circulate throughout the whole plant. The roasted beans are then ground and the ground coffee or coffee mixture pressed into tablets and finally packed and sealed, the whole of these operations being conducted in the same or a similar atmosphere. Other inert gases may be employed, for instance, nitrogen, hydrogen or argon, although at the present time the latter can hardly be termed commercially possible on account of cost.

After grinding the coffee may either be prepared in a pure state or may be mixed with other substances, such as, chicory, oats, figs or the like, and is then compressed into tablets preferably containing sufficient for a single cup of coffee. The compression may be performed in any suitable form of press in one or more stages, but it is desirable to use a known type of press which enables the gases to escape from within the tablets during pressure, otherwise laminations are liable to be formed in their structure with consequent liability to breakage of the tablet. Pressures of the order of 1 to 3 tons per square inch are advisable to produce a

satisfactory degree of hardness and freedom from crumbling under ordinary conditions of commercial handling.

The tablets may conveniently be made approximately  $2\frac{1}{2}$  inches by  $1\frac{1}{4}$  inches by  $\frac{3}{16}$  inches with an indentation across the centre of about  $\frac{1}{3}$  of the thickness for ease of breaking into halves. Such tablets contain roughly  $\frac{1}{32}$  lbs, and may be packed in an outer carton in that form, but are preferably protected previous to being packed in cartons, by wrapping them, singly or more, in a wrapper of paper or other suitable material, or by other preservative treatment. The tablets may be stored in an inert gas within containers of metal or the like in which they are preferably hermetically sealed or they may be wrapped and sealed in wrappers in a similar atmosphere.

The wrapping may conveniently consist of a viscose or acetate material lacquered on one or preferably both sides to render it gas tight. This is applied in an inert atmosphere and sealed either by a hot plate applied to the seams, known as heat sealing, or by the use of adhesives or by the two methods in combination, when the longitudinal joint may have the lacquered surfaces heat sealed and the folds at the end may be adhesively secured, or the ends may be heat sealed and then turned over and secured by adhesive. The use of heat during this stage to soften the portions of the wrapper where it is bent over at the ends, is desirable.

The diffusibility of gases through such a wrapper is influenced by the percentage of moisture in the gas. It is preferable to use a thicker coating of lacquer on the wrapper than that supplied in commercial grades of "moisture proof" wrappers, or alternatively to use a lacquer of special composition. Alternatively wrappers, such as, of tin foil, vegetable parchment, grease proof paper and the like may be employed if required, but these do not give the permanent protection afforded by the preferred material. Where, however, commercial considerations require it, such inferior wrappers may be sufficiently satisfactory for the purpose.

Wrapped tablets may be stored in inert gas within metal or other, preferably hermetically, sealed containers, or may be packed in cartons for ease of transport and handling. In a further form cartons may be used having a layer of bitumen or like impervious substance between two cardboard or fibre layers.

The preparation and packing process herein before described is equally applicable

able to mixtures wherein such materials as wheat, oats, rye, chicory, figs and other substances are added to coffee.

The apparatus for carrying out the process in the case of coffee may be of known type, but may be arranged so that the roasting, grinding, compressing and packing all take place in a circulating closed circuit of inert gas, in which circuit it is desirable to condense the steam given off from roasting coffee beans after the gas leaves the roaster. In such a system the gas may pass longitudinally through the roasting cylinders and upwards through the grinder, since the volatile gas released in this process tends to rise. Conversely it is also possible to arrange each stage separately to take place in the inert gas by enclosing the apparatus concerned and supplying the gas thereto.

Carbon dioxide for the process may be obtained by any of the known methods, namely, the burning of lime or magnesite, by fermentation, or by passing steam over coke.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A process for the preparation of coffee or a mixture containing coffee, characterised in that ground coffee or a mixture containing coffee is pressed into tablets in an atmosphere of an inert gas or gases or whilst substantially excluding the presence of oxygen.

2. A process according to claim 1, wherein the packing or wrapping or the

wrapping and packing of the tablets in containers are carried out in an inert gas or gases or whilst substantially excluding the presence of oxygen.

3. A process according to claim 1, wherein all the stages including blending, roasting, grinding, tableting and packing or wrapping are carried out in an inert gas or gases.

4. A process according to claim 1, 2 or 3 wherein the inert gas is obtained from roasting the coffee beans.

5. A process according to claim 1, 2 or 3 wherein the inert gas consists wholly or mostly of carbon dioxide.

6. A process according to any one of claims 1 to 5, wherein the product is sealed in an inert gas within a metal container.

7. A process according to any one of claims 1 to 5, wherein the product is sealed within a lacquered or unlacquered wrapper having a viscose or acetate basis.

8. A process according to any one of claims 1 to 5, wherein the product is packed in wrappers partially or wholly gas tight and additionally sealed in tins or like containers.

9. Processes for preparing tablets of coffee or mixtures containing coffee, substantially as described.

10. Tablets of coffee or mixtures containing coffee when prepared by a process according to any of the preceding claims.

Dated the 27th day of June, 1933.

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